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Luminaire

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Luminaire

The invention relates to a luminaire comprising:

a main reflector with a light emission window;

a counter reflector positioned opposite to the main reflector;

means for accommodating at least one electric lamp positioned in between the

5 main reflector and the counter reflector.

Such a luminaire is known from EP-535416. In the known luminaire, which provides indirect lighting, the problem of glare perceived by an observer is counteracted. Research has shown that human beings have a distinct preference for rooms which are uniformly illuminated. In other words, a person may comfortably perform a task in an area at a relatively low luminance level provided there is a minimum of light available and the luminance pattern does not change substantially within his field of view. As indicated, the known luminaire has as a principal aim the generation of light while masking completely the origin of the light. However, by the known luminaire a dark area is generated by the counter reflector due to its shielding function, resulting in a luminance pattern at the ceiling with a substantial change in luminance. The presence of said dark area during operation of the known luminaire is a disadvantage, as it is undesirable from an aesthetic as well as a psychological viewpoint because of the preferences mentioned above.

20 In another type of luminaire the counter reflector is provided with a perforation thus to obtain a subtle brightness of the counter reflector to reduce the contrast between the relatively dark counter reflector and the relatively bright reflector. In such a luminaire, said perforations are liable to obstruction of by collection of dust and/or dead insects thus blocking light transmission through said perforations and subsequent loss of the subtle brightness of the counter reflector.

25 It is an object of the invention to provide a luminaire of the type described in the opening paragraph in which said disadvantage is counteracted. Thereto the luminaire of

the type described in the opening paragraph is characterized in that the counter reflector provided with a light transmittable cover which is positioned on a side of the counter reflector facing away from the means for accommodating the at least one lamp. Part of the light generated by the lamp is coupled into the light transmittable cover, either directly or after being reflected by the main reflector. Said light is partly transmitted via internal reflection through the bulk material of the cover. The cover becomes bright through the scattering of light due to defects present in the bulk, e.g. inhomogenities or voids, or at the surface, e.g. scratches, of the cover.

In an alternative embodiment of the inventive luminaire the counter reflector consists of a reflective coating provided on a side of the cover facing towards the means for accommodating the at least one electric lamp. In such a version the counter reflector in fact is integrated with the transparent cover. An additional advantage of this arrangement is the possibility to make use of reflection qualities at the outer surface of it. Reflections on this surface contribute to a desired luminance distribution of the cover.

In an embodiment of the inventive luminaire the cover is a light guide. The application of a light guide enables a controlled distribution of light emission from the light guide. Thus a relatively homogeneous and subtle brightness of the cover has become possible.

In a further embodiment of the inventive luminaire the cover is connected to the counter reflector via suspension contacts. To avoid uncontrolled light exitance, the cover can be close to the counter reflector but must not make 'optical' contact. Preferably, the cover thereto essentially only contacts the counter reflector via its suspension contacts. It is further preferred that the suspension contacts consists of an outer edge of the counter reflector to obtain a further homogeneous brightness of the cover. The cover is partially coated with a reflective layer. In a special version the inner surface of the transparent cover could be (partially) coated with layer, e.g. a metal layer of aluminium, having 'optical' contact, e.g. through vacuum deposition. Thus the cover can relatively easily be given a desired, subtle brightness pattern.

In still another embodiment of the inventive luminaire the cover is provided with a light extracting structure. The light extraction can be realised by a structure of lenses, prisms, a diffusor body and combinations thereof. Locally, the light is deviated from further guidance through the medium into exitance in observers' directions. Such light extracting structures enable a desired distribution and appearance of the optical brightness of the cover.

In an alternative embodiment of the inventive luminaire the diffusor body is provided on a side of the cover facing away from the counter reflector and extends partly inside and partly outside the cover. The brightness of the individual diffusor body depends on many geometrical parameters and on the opaqueness of diffusor material. All can be
5 influenced by the designer and make it feasible to bring about a desired brightness effect. The diffusor body has a penetration depth p and an object dimension o . Both p and o determine the fraction of light available for scattering at the diffusor body. The cover has a narrowing thickness n which determines the fraction of light available for guidance towards diffusers further away. The diffusor body is positioned at a distance d from an adjacent diffusor body,
10 which d determines the average luminance over a bigger part of the cover. The diffusor bodies may be made of opaque material which can be co-extruded in the appropriate geometry together with the extrusion of the clear main part.

In another alternative embodiment of the inventive luminaire an upper edge of the cover is coated with a colour filter. It is thus enabled to give the cover a desired colour
15 appearance by the appropriate colour filter.

Other features and advantages of the invention are elucidated in schematic drawings of the luminaire in which,

- 20 Fig. 1 is a cross section of a first embodiment of the inventive luminaire;
 Fig. 2 is a detail of the luminaire of Fig. 1;
 Fig. 3 is a detail of another embodiment of the inventive luminaire.

25 Fig. 1 shows a luminaire 1 comprising a main reflector 3 with a light emission window 5, and comprising a counter reflector 7 positioned opposite to the main reflector. Means 9 for accommodating at least one electric lamp 11 are provided in the luminaire in between the main reflector and the counter reflector. The counter reflector is provided with a light transmittable cover 13, for example made of transparent polycarbonate acting as a light
30 guide and which is positioned on a side 15 of the counter reflector facing away from the means 9. Via suspension contacts 17, in the figure formed by an outer edge 19 of the counter reflector, the cover is connected to the counter reflector. These suspension contacts form the only contact between the counter reflector and the cover to counteract undesired exitance of light. The cover is provided with diffusor bodies 21 which scatter the light that is coupled

into the cover, either directly, e.g. via light ray 23, or indirectly such as via light ray 25 b reflected by the main reflector, and which is transmitted through the bulk of the cover.

Fig. 2 shows that in the inventive luminaire of Fig. 1 the cover 13 is provided onto the counter reflector 7 at a side 15 facing away from the means 9. Diffusor bodies 21 provided on a side 27 of the cover facing away from the counter reflector. Said diffusor bodies extend partly inside and partly outside the cover. The diffusor bodies thereto have a penetration depth p and an object dimension o . Both p and o determine the fraction of light available for scattering at that position. The cover has a narrowing thickness n which determines the fraction of light available for guidance towards diffusers further away. The diffusor bodies are mutually positioned at a distance d from adjacent diffusor bodies, which determines the average luminance over a bigger part of the cover. The diffusor bodies are made of opaque material, for example opaque polycarbonate, which can be co-extruded in the appropriate geometry together with the extrusion of the clear main part of the cover. In the figure the clear part has a thickness of 2 mm with diffusing 'lines' of $o = 1.4$ mm, $p = 0.15$ mm and $d = 6$ mm. Quite a satisfying luminance distribution of the cover in the luminaire is achieved with the given set of dimensions. The penetration depth p may vary from 0 to 20% of a thickness t at an entrance of the cover to 0 to 100% of t at positions most far away of the diffusor bodies. A colour filter 28 is provided as a coating at an upper edge 30 of the cover.

Fig. 3 is a detail of another embodiment of the inventive luminaire in which it is shown that the cover 13 is provided with a light extracting structure, i.e. in the figure lenses 29 adjacent to and/or at a surface 31 facing towards the counter reflector 7.

CLAIMS:

1. A luminaire comprising:
a main reflector with a light emission window;
a counter reflector positioned opposite to the main reflector;
means for accommodating at least one electric lamp positioned in between the
5 main reflector and the counter reflector,
characterized in that the counter reflector is provided with a light transmittable
cover which is positioned on a side of the counter reflector facing away from the means for
accommodating the at least one lamp.
- 10 2. A luminaire as claimed in claim 1, characterized in that the counter reflector
consists of a reflective coating provided on a side of the cover facing towards the means for
accommodating the at least one electric lamp.
- 15 3. A luminaire as claimed in claim 1 or 2, characterized in that the cover is a light
guide.
4. A luminaire as claimed in claim 1, characterized in that the cover is connected
to the counter reflector via suspension contacts.
- 20 5. A luminaire as claimed in claim 4, characterized in that the cover essentially
only contacts the counter reflector via its suspension contacts.
6. A luminaire as claimed in claim 4 or 5, characterized in that the suspension
contacts consists of an outer edge of the counter reflector.
- 25 7. A luminaire as claimed in claim 4 or 5, characterized in that the cover is
partially coated with a reflective layer.

8. A luminaire as claimed in claim 1 or 2, characterized in that the cover is provided with a light extracting structure.

5 9. A luminaire as claimed in claim 8, characterized in that the light extracting structure is chosen from the group consisting of a lens, a prism, a diffusor body and combinations thereof.

10. A luminaire as claimed in claim 8, characterized in that the diffusor body is provided on a side of the cover facing away from the counter reflector and extends partly
10 inside and partly outside the cover.

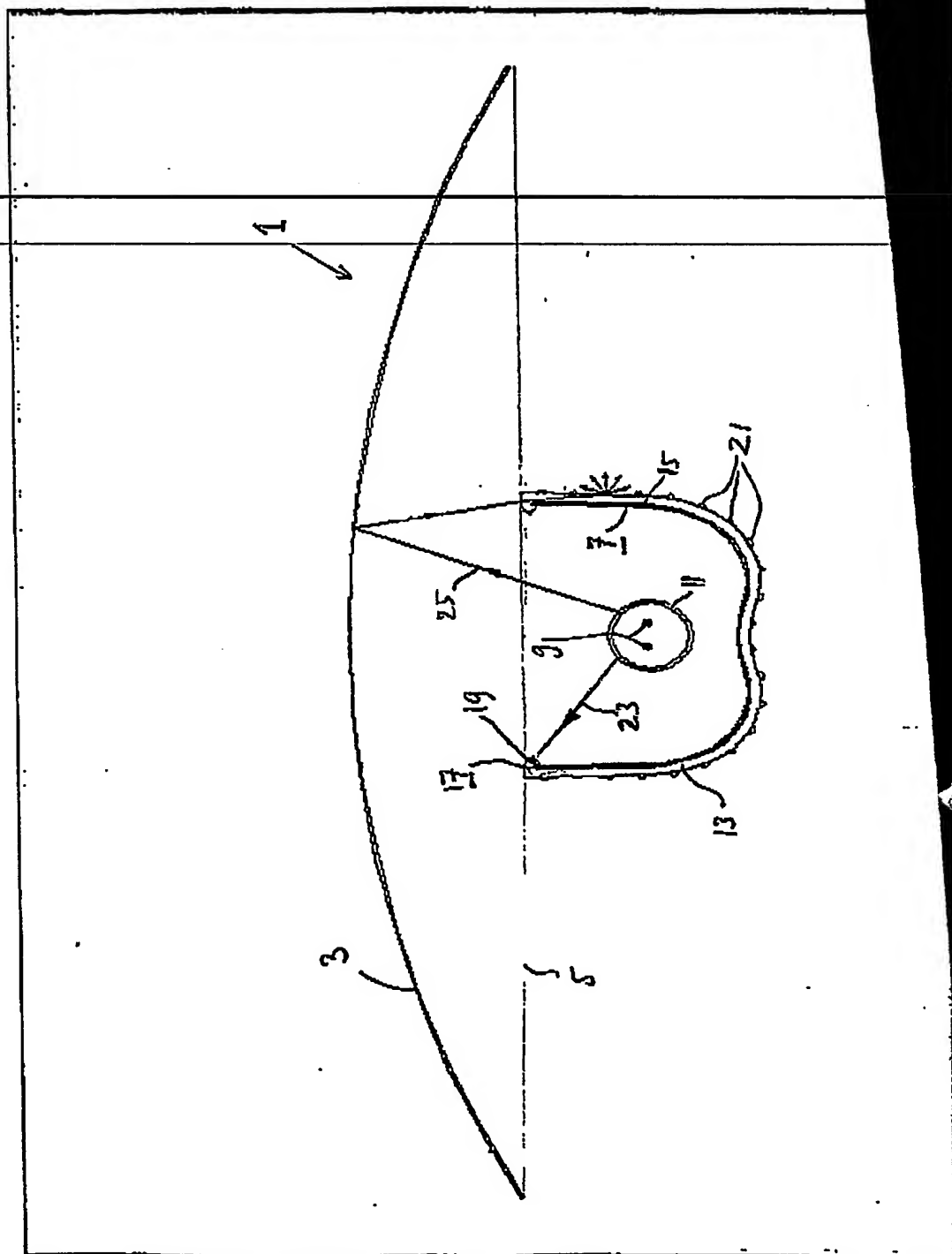
11. A luminaire as claimed in claim 1 or 2, characterized in that an upper edge of the cover is coated with a colour filter.

ABSTRACT:

A luminaire (1) is disclosed, comprising a main reflector (3) with a light emission window (5), and comprising a counter reflector (7) positioned opposite to the main reflector. Means (9) for accommodating at least one electric lamp (11) are provided in the luminaire in between the main reflector and the counter reflector. The counter reflector is
5 provided with a light transmittable cover (13), acting as a light guide and which is positioned on a side (15) of the counter reflector facing away from the means (9). The cover is provided with diffusor bodies (21) which scatter the light that is coupled into the cover and which is transmitted through the bulk of the cover. Thus a desired distribution and appearance of the optical brightness of the cover is obtained.

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Fig. 1



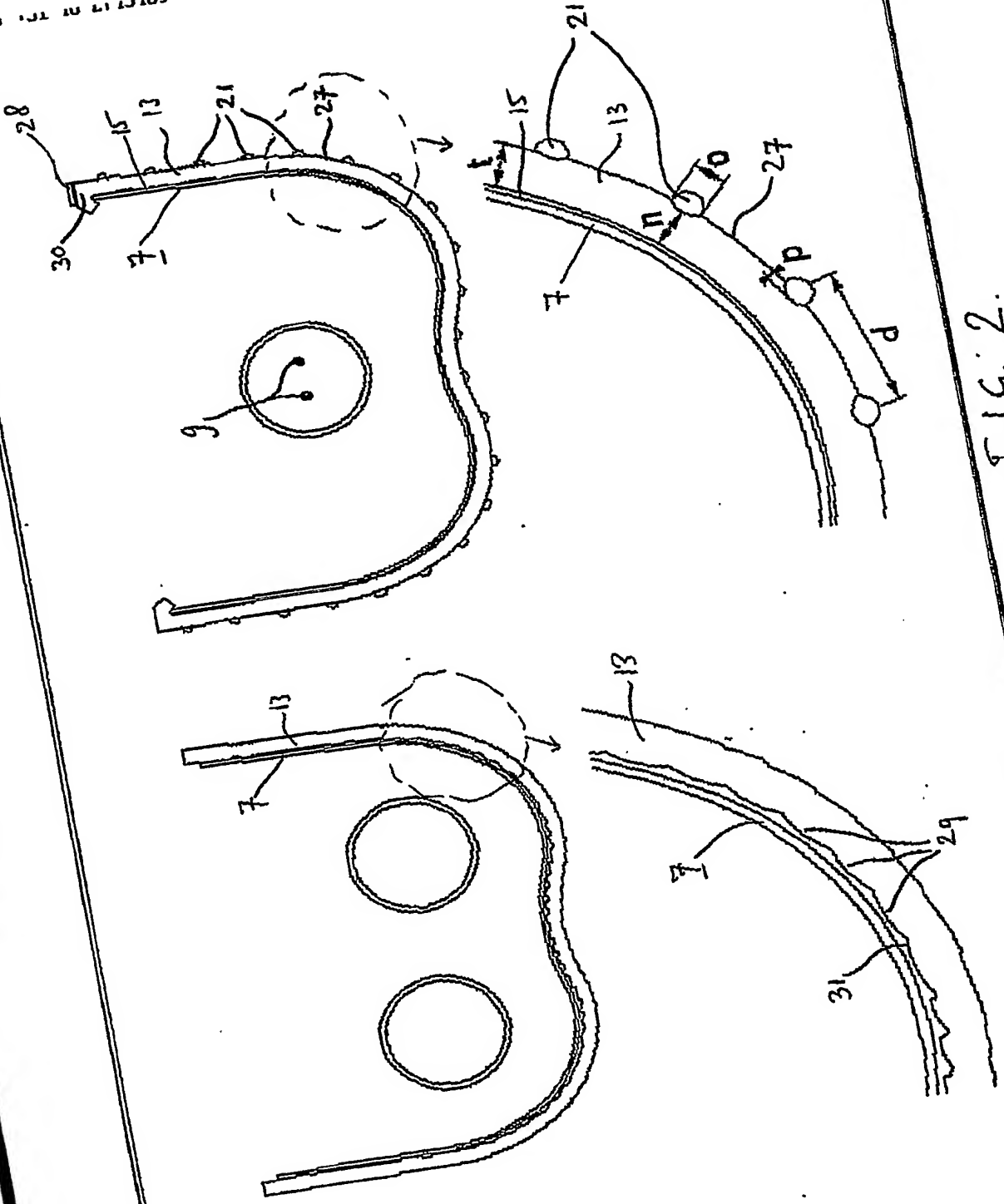
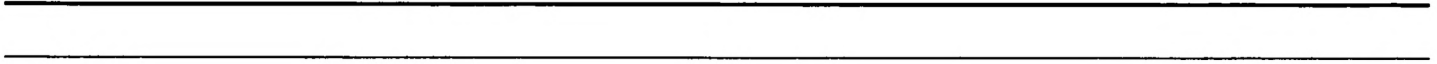


FIG. 2.

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